

Express Mail No.: EL 501 635 975 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of: Tian et al.

Application No.: To be assigned

Group Art Unit: To be assigned

Filed: Concurrently Herewith

Examiner: To be assigned

For: **HELICOBACTER PROTEINS, GENE
SEQUENCES AND USES THEREOF**

Attorney Docket No.: 7969-088

jc813 U.S. PTO
09/732091
12/07/00

TRANSMITTAL OF SEQUENCE LISTING UNDER 37 C.F.R. § 1.821

Assistant Commissioner for Patents
Washington, DC 20231

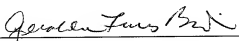
Sir:

In accordance with 37 C.F.R. § 1.821, Applicants, in connection with the above-identified patent application, submit herewith a Sequence Listing in paper and computer readable form pursuant to 37 C.F.R. §§ 1.821(c) and (e).

I hereby state that the content of the paper and computer readable copies of the Sequence Listing, submitted in accordance with 37 C.F.R. §§ 1.821(c) and (e), respectively, are the same.

Respectfully submitted,

Date: December 7, 2000


Geraldine F. Baldwin 31.232
(Reg. No.)

PENNIE & EDMONDS LLP
1155 Avenue of the Americas
New York, New York 10036-2711
(212) 790-9090

Enclosures

SEQUENCE LISTING

<110> Tian, Jing-Hui
Walker, Richard I.
Jackson, W. James

<120> Helicobacter proteins, gene sequences and uses thereof

<130> 7969-088

<140> To Be Assigned

<141> 2000-11-28

<160> 44

<170> PatentIn Ver. 2.1

<210> 1

<211> 1476

<212> DNA

<213> Helicobacter sp.

<400> 1

```

atggaattga atcaaccacc actccctaca gaaattgatg gtgacgctta tcataagccg 60
agtttttaag atttgggctt aaaagaatcg gttttaaaat ccgtttatga agccgggttc 120
acttccccaag gcccaattca agaaaaggcc attccggctg ttttgcaagg ccgagatgtc 180
atgcacaaag cccaacacag cacaggaaaa accgccgctt tcgctctgcc cattatcaac 240
aaccttataaa acaaccacac catagaagcc ctagtgatca cgccccaccg agaattagcc 300
atgcacaatta gcgatgagat ttccaattg ggcaaacaca ccaggactaa aaccgtgtgc 360
gtgtatggag gccagagcgt taaaaagcaa tgcgaattca ttaagaaaaa tccccaaagt 420
atgatcgcta caccaggaag gctgctogat cacttaaaaa acgaacgcgt ccataaattt 480
gtgcctaaag tggctggttt agatgaaagc gatgaaatgc tggatatggg gtttttagac 540
gatattgaag agatttttga ctacctccct agcgaagcgc agattttgct tttttcagcc 600
acgatgccag agccgattaa aagactagcg gataagattt tagaaaaacc tattaaatcc 660
catatcgctc ctctaatat cactaacacc gacatcccc aacgctttta tgtgatcaat 720
gagcatgaga gggccgaagc gatcatgcgc cttttagaca ccaagcacc caaaaagagc 780
atgtttttca cgcgcactaa aaaagaagcc gatgaattgc accaattcct tgcttctaaa 840
aatttcaaaa gcaccgcctt gcatggggat atggatcaaa gggatcggcg ctcttctatc 900
atggcggttta aaaaaaatga cgctgatgtg ttggtggcta cagatgtggc gagtctgtgg 960
ctagatatta gcggtgtaag ccatgtgttt aattaccact tgcacctaaa cactgagagc 1020
tatatccatc gcatcgggag aaccgggcga gcggggcaaa aaggcatggc gtcacttta 1080
gtaacccctt tagaatacaa agagctttta cgcgatgcaa aagaaattga gtcacttta 1140
gaactctttg aaatccacac cattaacgaa aatcagatca tcaaaacctt gcattagcgt 1200
aaagtgtctg aagggatctc cagcctttat gaacagctta ccgaaatttt tgagcgtct 1260
caattggttt taaaactttt gagtttgagc ttgaaacca gcaaaatttg cttaaaccag 1320
caagaattg acgcgattca aaaccttaaa gaaaaaacgc caaaacctc taacaaaaaa 1380
acgcccacac atgagcagcg cgtctcttc aaaaagggtc agcacagaga cagacacctt 1440
aaaacaacc attattctaa aaacccaaa cgcggt 1476

```

<210> 2

<211> 492

<212> PRT

<213> Helicobacter sp.

<400> 2

Met Glu Leu Asn Gln Pro Pro Leu Pro Thr Glu Ile Asp Gly Asp Ala
1 5 10 15

Tyr His Lys Pro Ser Phe Asn Asp Leu Gly Leu Lys Glu Ser Val Leu
20 25 30

Lys Ser Val Tyr Glu Ala Gly Phe Thr Ser Pro Ser Pro Ile Gln Glu
35 40 45

Lys Ala Ile Pro Ala Val Leu Gln Gly Arg Asp Val Ile Ala Gln Ala
50 55 60

Gln Thr Gly Thr Gly Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn
65 70 75 80

Asn Leu Lys Asn Asn His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr
85 90 95

Arg Glu Leu Ala Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys
100 105 110

His Thr Arg Thr Lys Thr Val Cys Val Tyr Gly Gly Gln Ser Val Lys
115 120 125

Lys Gln Cys Glu Phe Ile Lys Lys Asn Pro Gln Val Met Ile Ala Thr
130 135 140

Pro Gly Arg Leu Leu Asp His Leu Lys Asn Glu Arg Ile His Lys Phe
145 150 155 160

Val Pro Lys Val Val Val Leu Asp Glu Ser Asp Glu Met Leu Asp Met
165 170 175

Gly Phe Leu Asp Asp Ile Glu Glu Ile Phe Asp Tyr Leu Pro Ser Glu
180 185 190

Ala Gln Ile Leu Leu Phe Ser Ala Thr Met Pro Glu Pro Ile Lys Arg
195 200 205

Leu Ala Asp Lys Ile Leu Glu Asn Pro Ile Lys Ile His Ile Ala Pro
210 215 220

Ser Asn Ile Thr Asn Thr Asp Ile Thr Gln Arg Phe Tyr Val Ile Asn
225 230 235 240

Glu His Glu Arg Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln Ala
245 250 255

Pro Lys Lys Ser Ile Val Phe Thr Arg Thr Lys Lys Glu Ala Asp Glu
260 265 270

Leu His Gln Phe Leu Ala Ser Lys Asn Tyr Lys Ser Thr Ala Leu His
275 280 285

Gly Asp Met Asp Gln Arg Asp Arg Arg Ser Ser Ile Met Ala Phe Lys
290 295 300

Lys Asn Asp Ala Asp Val Leu Val Ala Thr Asp Val Ala Ser Arg Gly
 305 310 315 320
 Leu Asp Ile Ser Gly Val Ser His Val Phe Asn Tyr His Leu Pro Leu
 325 330 335
 Asn Thr Glu Ser Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala Gly
 340 345 350
 Lys Lys Gly Met Ala Ile Thr Leu Val Thr Pro Leu Glu Tyr Lys Glu
 355 360 365
 Leu Leu Arg Met Gln Lys Glu Ile Asp Ser Glu Ile Glu Leu Phe Glu
 370 375 380
 Ile Pro Thr Ile Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala
 385 390 395 400
 Lys Val Ser Glu Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile
 405 410 415
 Phe Glu Pro Ser Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu
 420 425 430
 Thr Ser Lys Ile Gly Leu Asn Gln Gln Glu Ile Asp Ala Ile Gln Asn
 435 440 445
 Pro Lys Glu Lys Thr Pro Lys Pro Ser Asn Lys Lys Thr Pro Gln His
 450 455 460
 Glu Arg Ala Arg Ser Phe Lys Lys Gly Gln His Arg Asp Arg His Pro
 465 470 475 480
 Lys Thr Asn His Tyr Ser Lys Lys Pro Lys Arg Arg
 485 490

<210> 3
 <211> 759
 <212> DNA
 <213> Helicobacter sp.

<400> 3
 atggcataca aatatgatag agacttggaa tttttaaaagc aattggaatc tagtgattta 60
 ttggatttgt ttgaggtgct tgttttttgg aaagacgcg aaaaaagaca caatgaaaaa 120
 ctgaccagct ccatagaata caaaaggcat ggcgatgatt acgctaataa cgcagaaaaga 180
 atcgctgaag agttgcaata ctatgggagc aatagttttg cgagttttcat taaaggcgaga 240
 ggagtcttat acaaagagat tttatgcat gtgtgcgata aattaaaggt caattacaac 300
 aagaaaactg aaacgacttt aattgaacaa aacatgcttt ctaaaaatctt agaagaagt 360
 ttggaagaaa tggatgatga agaagtgaag gaaatgtgag atgaattatc cataaaaaaac 420
 acggacaatt taaacagaca agccttaagc gcggcgactt taacgctgtt taaatggggg 480
 ggttttaaat cttatcaatt agctgtcatt gtgtcgaaat cggtcgcaaa aaccattcta 540
 cggcggtggt tatcgcttgc gggcaatcag gtgcttacaa gaactctgag ctttttaaca 600
 ggtcctgttg ctggatcat tacaggcgta tggacacgga ttgatattgc agggccgggt 660
 tatagggtaa ccataccggc atgcattgtg gtgtccactt tacgcctaaa aacacagcaa 720
 gccaatggag ataagaagtc gttgcaaata gaattccatt 759

<210> 4
 <211> 253
 <212> PRT
 <213> Helicobacter sp.

<400> 4
 Met Ala Tyr Lys Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu
 1 5 10 15
 Ser Ser Asp Leu Leu Asp Leu Phe Glu Val Leu Val Phe Gly Lys Asp
 20 25 30
 Gly Glu Lys Arg His Asn Glu Lys Leu Thr Ser Ser Ile Glu Tyr Lys
 35 40 45
 Arg His Gly Asp Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu
 50 55 60
 Leu Gln Tyr Tyr Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu
 65 70 75 80
 Gly Val Leu Tyr Lys Glu Ile Leu Cys Asp Val Cys Asp Lys Leu Lys
 85 90 95
 Val Asn Tyr Asn Lys Lys Thr Glu Thr Thr Leu Ile Glu Gln Asn Met
 100 105 110
 Leu Ser Lys Ile Leu Glu Arg Ser Leu Glu Glu Met Asp Asp Glu Glu
 115 120 125
 Val Lys Glu Met Cys Asp Glu Leu Ser Ile Lys Asn Thr Asp Asn Leu
 130 135 140
 Asn Arg Gln Ala Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly
 145 150 155 160
 Gly Phe Lys Ser Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala
 165 170 175
 Lys Thr Ile Leu Gly Arg Gly Leu Ser Leu Ala Gly Asn Gln Val Leu
 180 185 190
 Thr Arg Thr Leu Ser Phe Leu Thr Gly Pro Val Gly Trp Ile Ile Thr
 195 200 205
 Gly Val Trp Thr Ala Ile Asp Ile Ala Gly Pro Ala Tyr Arg Val Thr
 210 215 220
 Ile Pro Ala Cys Ile Val Val Ala Thr Leu Arg Leu Lys Thr Gln Gln
 225 230 235 240
 Ala Asn Gly Asp Lys Lys Ser Leu Gln Ile Glu Ser Ile
 245 250

<210> 5
 <211> 54
 <212> PRT

<213> Helicobacter sp.

<400> 5

Thr Glu Ile Asp Gly Asp Ala Tyr His Lys Pro Ser Phe Asn Asp Leu
1 5 10 15

Gly Leu Lys Glu Ser Val Leu Lys Ser Val Tyr Glu Ala Gly Phe Thr
20 25 30

Ser Pro Ser Pro Ile Gln Glu Lys Ala Ile Pro Ala Val Leu Gln Gly
35 40 45

Arg Asp Val Ile Ala Gln
50

<210> 6

<211> 31

<212> PRT

<213> Helicobacter sp.

<400> 6

Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn Asn Leu Lys Asn Asn
1 5 10 15

His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr Arg Glu Leu Ala
20 25 30

<210> 7

<211> 26

<212> PRT

<213> Helicobacter sp.

<400> 7

Ala Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys His Thr Arg
1 5 10 15

Thr Lys Thr Val Cys Val Tyr Gly Gly Gln
20 25

<210> 8

<211> 41

<212> PRT

<213> Helicobacter sp.

<400> 8

Val Met Ile Ala Thr Pro Gly Arg Leu Leu Asp His Leu Lys Asn Glu
1 5 10 15

Arg Ile His Lys Phe Val Pro Lys Val Val Val Leu Asp Glu Ser Asp
20 25 30

Glu Met Leu Asp Met Gly Phe Leu Asp
35 40

<210> 9
<211> 31
<212> PRT
<213> Helicobacter sp.

<400> 9
Ile Phe Asp Tyr Leu Pro Ser Glu Ala Gln Ile Leu Leu Phe Ser Ala
1 5 10 15
Thr Met Pro Glu Pro Ile Lys Arg Leu Ala Asp Lys Ile Leu Glu
20 25 30

<210> 10
<211> 23
<212> PRT
<213> Helicobacter sp.

<400> 10
Asn Glu His Glu Arg Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln
1 5 10 15
Ala Pro Lys Lys Ser Ile Val
20

<210> 11
<211> 36
<212> PRT
<213> Helicobacter sp.

<400> 11
Ala Asp Glu Leu His Gln Phe Leu Ala Ser Lys Asn Tyr Lys Ser Thr
1 5 10 15
Ala Leu His His Gly Asp Met Asp Gln Arg Asp Arg Arg Ser Ser Ile Met
20 25 30
Ala Phe Lys Lys
35

<210> 12
<211> 41
<212> PRT
<213> Helicobacter sp.

<400> 12
Gly Leu Asp Ile Ser Gly Val Ser His Val Phe Asn Tyr His Leu Pro
1 5 10 15
Leu Asn Thr Glu Ser Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala
20 25 30
Gly Lys Lys Gly Met Ala Ile Thr Leu
35 40

<210> 13
<211> 31
<212> PRT
<213> Helicobacter sp.

<400> 13
Arg Ala Gly Lys Lys Gly Met Ala Ile Thr Leu Val Thr Pro Leu Glu
1 5 10 15
Tyr Lys Glu Leu Leu Arg Met Gln Lys Glu Ile Asp Ser Glu Ile
20 25 30

<210> 14
<211> 36
<212> PRT
<213> Helicobacter sp.

<400> 14
Ile Pro Thr Ile Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala
1 5 10 15
Lys Val Ser Glu Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile
20 25 30
Phe Glu Pro Ser
35

<210> 15
<211> 21
<212> PRT
<213> Helicobacter sp.

<400> 15
Ser Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu Thr Ser Lys
1 5 10 15
Ile Gly Leu Asn Gln
20

<210> 16
<211> 30
<212> PRT
<213> Helicobacter sp.

<400> 16
Met Ala Tyr Lys Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu
1 5 10 15
Ser Ser Asp Leu Leu Asp Leu Phe Glu Val Leu Val Phe Gly
20 25 30

<210> 17
<211> 38
<212> PRT

<213> Helicobacter sp.

<400> 17

Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu Leu Gln Tyr Tyr
1 5 10 15

Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu Gly Val Leu Tyr
20 25 30

Lys Glu Ile Leu Cys Asp
35

<210> 18

<211> 30

<212> PRT

<213> Helicobacter sp.

<400> 18

Leu Glu Glu Met Asp Asp Glu Glu Val Lys Glu Met Cys Asp Glu Leu
1 5 10 15

Ser Ile Lys Asn Thr Asp Asn Leu Asn Arg Gln Ala Leu Ser
20 25 30

<210> 19

<211> 41

<212> PRT

<213> Helicobacter sp.

<400> 19

Asn Arg Gln Ala Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly
1 5 10 15

Gly Phe Lys Ser Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala
20 25 30

Lys Thr Ile Leu Gly Arg Gly Leu Ser
35 40

<210> 20

<211> 49

<212> PRT

<213> Helicobacter sp.

<400> 20

Val Gly Trp Ile Ile Thr Gly Val Trp Thr Ala Ile Asp Ile Ala Gly
1 5 10 15

Pro Ala Tyr Arg Val Thr Ile Pro Ala Cys Ile Val Val Ala Thr Leu
20 25 30

Arg Leu Lys Thr Gln Gln Ala Asn Gly Asp Lys Lys Ser Leu Gln Ile
35 40 45

Glu

<210> 21
<211> 162
<212> DNA
<213> *Helicobacter* sp.

<400> 21
acagaaattg atgggtgacgc ttatcataag ccgagtttta atgatttggg cttaaaagaa 60
tcggtttttaa aatccgttta tgaagccggc ttcacttccc caagcccat tcaagaaaag 120
gccattccgg ctgttttgca aggccgagat gtcatcgac aa 162

<210> 22
<211> 93
<212> DNA
<213> *Helicobacter* sp.

<400> 22
aaaacgcgcg ctttcgctct gccattatc aacaacctta aaaacaacca cccatagaa 60
gccctagtga tcacgcccac cagagaatta gcc 93

<210> 23
<211> 78
<212> DNA
<213> *Helicobacter* sp.

<400> 23
gccatgcaaa ttagcgatga gatthtcaa ttgggcaaac acaccaggac taaaaccgtg 60
tgcgtgtatg gagggcag 78

<210> 24
<211> 123
<212> DNA
<213> *Helicobacter* sp.

<400> 24
gtgatgatg ctacaccagg aaggctgctc gatcacttaa aaaacgaacg catccataaa 60
tttgtgccta aagtggctgt ttagatgaa agcgatgaaa tgcgtgatat ggggttttta 120
gac 123

<210> 25
<211> 93
<212> DNA
<213> *Helicobacter* sp.

<400> 25
atthttgact acctccctag cgaagcgcag atthttgctt tttcagccac gatgccagag 60
ccgattaaaa gactagcgga taagatttta gaa 93

<210> 26
<211> 69
<212> DNA

<213> Helicobacter sp.

<400> 26
aatgagcatg agagggccga agcgatcatg cgccttttag acaccaagc acccaaaaag 60
agcattggt 69

<210> 27

<211> 108

<212> DNA

<213> Helicobacter sp.

<400> 27
gccgatgaat tgcaccaatt ccttgcttct aaaaattaca aaagcacgcg cttgcatggg 60
gatatggatc aaagggatcg gcgctcttct atcatggcgt ttaaaaaa 108

<210> 28

<211> 123

<212> DNA

<213> Helicobacter sp.

<400> 28
gggctagata tttagcgtgt aagccatgtg ttttaattacc acttgccctt aaacactgag 60
agctatatcc atcgcatcgg gagaaccggg cgagcgggca aaaaaggcat ggcgatcact 120
tta 123

<210> 29

<211> 93

<212> DNA

<213> Helicobacter sp.

<400> 29
cgagcgggca aaaaaggcat ggcgatcact ttagtaacc ctttagaata caaagagctt 60
ttacgcacgc aaaaagaaat tgattcagag att 93

<210> 30

<211> 108

<212> DNA

<213> Helicobacter sp.

<400> 30
atccccacca ttaacgaaaa tcagatcatc aaaaaccttc atgacgctaa agtgtctgaa 60
gggatcatca gcctttatga acagcttacc gaaatttttg agccgtct 108

<210> 31

<211> 63

<212> DNA

<213> Helicobacter sp.

<400> 31
tctcaattgg ttttaaaact tttgagtttg cagtttgaaa ccagcaaaat tggcttaaac 60
cag 63

<210> 32
<211> 90
<212> DNA
<213> *Helicobacter* sp.

<400> 32
atggcataca aatatgatag agacttggaa tttttaaacg aattggaatc tagtgattta 60
ttggatttgt ttgaggtgct tgtttttggt 90

<210> 33
<211> 114
<212> DNA
<213> *Helicobacter* sp.

<400> 33
gattacgcta aatacgcaga aagaatcgct gaagagtgc aatactatgg gagcaatagt 60
tttcgagttt tcattaaagg cgaaggagtc ttatacaaaag agatttttatg cgat 114

<210> 34
<211> 90
<212> DNA
<213> *Helicobacter* sp.

<400> 34
ttggaagaaa ttgatgatga agaagtgaag gaaatgtgct atgaattatc cataaaaaac 60
acggacaatt taaacagaca agccttaagc 90

<210> 35
<211> 108
<212> DNA
<213> *Helicobacter* sp.

<400> 35
aacagacaag ccttaagcgc ggcgacttta acgctgttta aaatgggggg ttttaaatct 60
tatcaattag ctgtcattgt tgcgaatgct gtcgcaaaaa ccatttcta 108

<210> 36
<211> 153
<212> DNA
<213> *Helicobacter* sp.

<400> 36
ggtcctgttg gctggatcat tacaggcgta tggacagcga ttgatattgc agggccggct 60
tatagggtaa ccataccggc atgcattgtg gttgccactt tacgcctaaa aacacagcaa 120
gccaatggag ataagaagtc gttgcaataa gaa 153

<210> 37
<211> 33
<212> DNA
<213> *Helicobacter* sp.

<400> 37
cagaggggag ccatggaatt gaatcaacca cca 33

<210> 38
 <211> 36
 <212> DNA
 <213> *Helicobacter* sp.
 <400> 38
 cagagggtcg acttaacggc gtttgggttt tttaga

36

<210> 39
 <211> 30
 <212> DNA
 <213> *Helicobacter* sp.
 <400> 39
 gcgggatcca tggcatacaa atatgataga

30

<210> 40
 <211> 32
 <212> DNA
 <213> *Helicobacter* sp.
 <400> 40
 gcggtcgact taaatggatt ctatttgcaa cg

32

<210> 41
 <211> 1512
 <212> DNA
 <213> *Helicobacter* sp.

<400> 41
 atgagaggat cgcataccca tcaccatcac ggcacatggt aattgaatca accaccactc 60
 cctacagaaa ttgatggtga cgcattatcat aagccgagtt ttaatgattt gggcttaaaa 120
 gaatcggttt taaaatccgt ttatgaagcc ggcttcactt cccaagccc cattcaagaa 180
 aaggccattc cggctgtttt gcaaggccga gatgtcatcg cacaagccca aacaggcaca 240
 ggaaaaaccc cgccttttgc tctgcccatt atcaacaacc ttaaaaaaca ccacaccata 300
 gaagccctat tgatcacgcc caccagagaa ttagccatgc aaattagcga tgagattttc 360
 aaattgggca aacacaccag gactaaaaacc gtgtgcgtgt atggaggcca gagcgtaaaa 420
 aagcaatgcg aattcattaa gaaaaatccc caagtgtatga tcgctacacc aggaaggctg 480
 ctgcatactt taaaaaacga acgcattccat aaatttgtgc ctaaatgtgt cgttttagat 540
 gaaagcgatg aaatgctgga tatgggggttt ttgacgata ttgaagagat ttttgactac 600
 ctccctagcg aagcgcgagat tttgcttttt tcagccacga tgccagagcc gatttaaaaa 660
 ctagcggata agattttaga aaacctattt aaaaatccata tcgctccttc taatatcact 720
 aacacgcaga tcacccaacg cttttatgtg atcaatgagc atgagagggc cgaagcgatc 780
 atgcgccttt tagacaccca agcaccacaa aagagcattg ttttcacgcg cactaaaaaa 840
 gaagccgatg aattgcaccca attccttgct tctaaaaaatt acaaaagcac cgccttgcat 900
 ggggatatgg atcaaaagga tcggcgctct tctatcatgg cgtttaaaaa aaatgacgct 960
 gatgtgttgg tggctacaga tgtggcgagt cgtgggctag atattagcgg tgtaagccat 1020
 gtgtttaatt accacttgcg cctaaacact gagagctata tccatcgcat cgggagaacc 1080
 gggcgagcgg gcaaaaaagg catggcgatc actttagtaa cccctttaga atacaaagag 1140
 cttttacgca tgcaaaaaga aattgattca gagattgaac tttttgaaat cccaccattt 1200
 aacgaaaatc agatcatcaa aaccttgcat gacgctaaag tgtctgaagg gatcatcagc 1260
 ctttatgaac agcttaccga aatttttgag ccgtctcaat tgggttttaa acttttgagt 1320
 ttgcagtttg aaaccagcaa aattggctta aaattgacgc gatccaacaa 1380
 cctaaagaaa aaacgcacaa accctctaac aaaaaaacgc cccaacatga gcgagcgcgt 1440

tttttcaaaa aggggtcagca cagagacaga caccctaataa caaaccatta ttctaataaaa 1500
cccaaacgcc gt 1512

<210> 42
<211> 504
<212> PRT
<213> Helicobacter sp.

<400> 42
Met Arg Gly Ser His His His His His Gly Ser Met Glu Leu Asn
1 5 10 15
Gln Pro Pro Leu Pro Thr Glu Ile Asp Gly Asp Ala Tyr His Lys Pro
20 25 30
Ser Phe Asn Asp Leu Gly Leu Lys Glu Ser Val Leu Lys Ser Val Tyr
35 40 45
Glu Ala Gly Phe Thr Ser Pro Ser Pro Ile Gln Glu Lys Ala Ile Pro
50 55 60
Ala Val Leu Gln Gly Arg Asp Val Ile Ala Gln Ala Gln Thr Gly Thr
65 70 75 80
Gly Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn Asn Leu Lys Asn
85 90 95
Asn His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr Arg Glu Leu Ala
100 105 110
Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys His Thr Arg Thr
115 120 125
Lys Thr Val Cys Val Tyr Gly Gly Gln Ser Val Lys Lys Gln Cys Glu
130 135 140
Phe Ile Lys Lys Asn Pro Gln Val Met Ile Ala Thr Pro Gly Arg Leu
145 150 155 160
Leu Asp His Leu Lys Asn Glu Arg Ile His Lys Phe Val Pro Lys Val
165 170 175
Val Val Leu Asp Glu Ser Asp Glu Met Leu Asp Met Gly Phe Leu Asp
180 185 190
Asp Ile Glu Glu Ile Phe Asp Tyr Leu Pro Ser Glu Ala Gln Ile Leu
195 200 205
Leu Phe Ser Ala Thr Met Pro Glu Pro Ile Lys Arg Leu Ala Asp Lys
210 215 220
Ile Leu Glu Asn Pro Ile Lys Ile His Ile Ala Pro Ser Asn Ile Thr
225 230 235 240
Asn Thr Asp Ile Thr Gln Arg Phe Tyr Val Ile Asn Glu His Glu Arg
245 250 255

Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln Ala Pro Lys Lys Ser
 260 265 270
 Ile Val Phe Thr Arg Thr Lys Lys Glu Ala Asp Glu Leu His Gln Phe
 275 280 285
 Leu Ala Ser Lys Asn Tyr Lys Ser Thr Ala Leu His Gly Asp Met Asp
 290 295 300
 Gln Arg Asp Arg Arg Ser Ser Ile Met Ala Phe Lys Lys Asn Asp Ala
 305 310 315 320
 Asp Val Leu Val Ala Thr Asp Val Ala Ser Arg Gly Leu Asp Ile Ser
 325 330 335
 Gly Val Ser His Val Phe Asn Tyr His Leu Pro Leu Asn Thr Glu Ser
 340 345 350
 Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala Gly Lys Lys Gly Met
 355 360 365
 Ala Ile Thr Leu Val Thr Pro Leu Glu Tyr Lys Glu Leu Leu Arg Met
 370 375 380
 Gln Lys Glu Ile Asp Ser Glu Ile Glu Leu Phe Glu Ile Pro Thr Ile
 385 390 395 400
 Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala Lys Val Ser Glu
 405 410 415
 Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile Phe Glu Pro Ser
 420 425 430
 Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu Thr Ser Lys Ile
 435 440 445
 Gly Leu Asn Gln Gln Glu Ile Asp Ala Ile Gln Asn Pro Lys Glu Lys
 450 455 460
 Thr Pro Lys Pro Ser Asn Lys Lys Thr Pro Gln His Glu Arg Ala Arg
 465 470 475 480
 Ser Phe Lys Lys Gly Gln His Arg Asp Arg His Pro Lys Thr Asn His
 485 490 495
 Tyr Ser Lys Lys Pro Lys Arg Arg
 500

<210> 43
 <211> 795
 <212> DNA
 <213> Helicobacter sp.

<400> 43
 atgagaggat cgcacaccca tcaccatcac ggattcatgg catacaaaata tgaatagagac 60
 ttggaatttt taaagcaatt ggaatctagt gatttattgg attgtttga ggtgcttgtt 120
 tttggtaaag acggcgaaaa aagacacaat gaaaaactga ccagctccat agaatacaaa 180

aggcattgagc atgattacgc taaatacgca gaaagaatcg ctgaagagtt gcaatactat 240
 gggagcaata gttttgagcgt ttctattaaa ggccaaggag tcttatataca agagattttaa 300
 tgcgatgtgt gcgataaatt aaaggtcaat tacaacaaga aaactgaac gactttaatt 360
 gaacaaaaa tgctttctaa aatcttagaa agaagtttgg aagaaatgga tgatgaagaa 420
 gtgaaagaaa tgtgcatga attatccata aaaaacacgg acaattttaa cagacaagcc 480
 ttaagcgcgc cgactttaac gctgttttaa atgggggggt ttaaatctta tcaattagct 540
 gtcattgttg cgaatcggtt cgcaaaaacc attctagggc gtggtttatc gcttgcgggc 600
 aatcagggtc ttacaagaac tctgagcttt ttaacagggt ctgttggctg gatcattaca 660
 ggcgatgga cagcgattga tattgcaggc ccggtttata gggtaacct accgcatgc 720
 attgtggtg ccactttacg cctaaaaaca cagcaagcca atggagataa gaagtcgtg 780
 caaatagaat ccatt 795

<210> 44

<211> 265

<212> PRT

<213> Helicobacter sp.

<400> 44

Met Arg Gly Ser His His His His His Gly Ser Met Ala Tyr Lys
 1 5 10 15

Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu Ser Ser Asp Leu
 20 25 30

Leu Asp Leu Phe Glu Val Leu Val Phe Gly Lys Asp Gly Glu Lys Arg
 35 40 45

His Asn Glu Lys Leu Thr Ser Ser Ile Glu Tyr Lys Arg His Gly Asp
 50 55 60

Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu Leu Gln Tyr Tyr
 65 70 75 80

Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu Gly Val Leu Tyr
 85 90 95

Lys Glu Ile Leu Cys Asp Val Cys Asp Lys Leu Lys Val Asn Tyr Asn
 100 105 110

Lys Lys Thr Glu Thr Thr Leu Ile Glu Gln Asn Met Leu Ser Lys Ile
 115 120 125

Leu Glu Arg Ser Leu Glu Glu Met Asp Asp Glu Glu Val Lys Glu Met
 130 135 140

Cys Asp Glu Leu Ser Ile Lys Asn Thr Asp Asn Leu Asn Arg Gln Ala
 145 150 155 160

Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly Gly Phe Lys Ser
 165 170 175

Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala Lys Thr Ile Leu
 180 185 190

Gly Arg Gly Leu Ser Leu Ala Gly Asn Gln Val Leu Thr Arg Thr Leu
 195 200 205

Ser Phe Leu Thr Gly Pro Val Gly Trp Ile Ile Thr Gly Val Trp Thr
 210 215 220
 Ala Ile Asp Ile Ala Gly Pro Ala Tyr Arg Val Thr Ile Pro Ala Cys
 225 230 235 240
 Ile Val Val Ala Thr Leu Arg Leu Lys Thr Gln Gln Ala Asn Gly Asp
 245 250 255
 Lys Lys Ser Leu Gln Ile Glu Ser Ile
 260 265